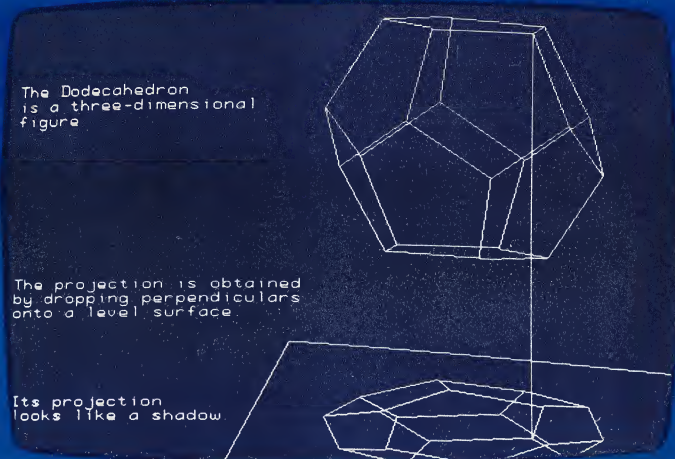


Short Form
Catalog
Spring 1980

CAT 8000 CAT 4200 **CAT-100**



**COMPLETE S-100 COLOR
GRAPHICS AND IMAGING
VIDEO FRAME GRABBER.**

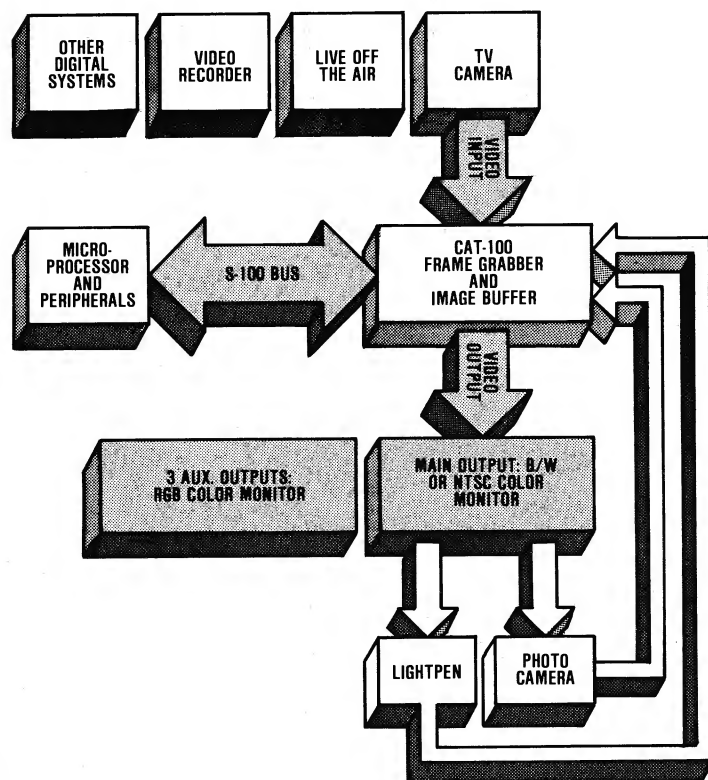


**DIGITAL
GRAPHIC
SYSTEMS**

A NEW CONCEPT IN COMPUTER CONTROLLED VIDEO EQUIPMENT

CAT-100 FULL COLOR GRAPHICS

Complete S-100 color imaging system
with high performance video FRAME GRABBER.



Since its introduction in 1978, the CAT-100 has provided S-100 users with high quality video imaging equipment. Three fundamental functions are performed:

- **digitization** of video input in real time
- **image storage** in dual-port on-board memory providing for software analysis of digitized image or direct software image generation
- **video output** of buffered image in gray levels, NTSC color or RGB color.

The standard two-board unit can be ordered with any of the options described in this brochure.

Larger units are available with up to 256K bytes of image memory and 24 bits per pixel.

STANDARD UNIT

The **standard unit** consists of two industry-standard S-100 boards with 32K bytes of image memory and a gray-scale video display generator.

The **32K-byte image memory** is fully accessible for image generation or processing in the address space of the S-100 bus through a 2K-byte window which can be dynamically selected or deselected by software. This window can be located on any 2K boundary in the processor address space.

The **video generator** displays the stored image in 16 shades of gray on standard B/W TV monitors.

FEATURES

INSTRUCTION AND STATUS REGISTERS

- 5 instruction registers and one status register
- Accessed as I/O ports with switch-selected address boundaries
- Can be located anywhere in I/O address space
- The 5 instruction registers allow a large variety of functional modes to be selected by software
- The status register permits S-100 software to closely monitor the status of CAT-100 video activity.

IMAGE MEMORY

- On-board 32K byte capacity in basic CAT-100 system
- Two-port design produces a totally snow-free and clean display:
 - internal port for fast video access
 - external port for S-100 bus. Access time: 1.4 μ S average
- Convenient addressing scheme:
 - Fixed access window in S-100 address space
 - Switch selectable window size (2K/8K) and window location
 - The software-selected page of CAT-100 image memory appears to the CPU as regular memory located in the window
 - Large buffers (up to 256K) can be addressed without consuming a large fraction of the S-100 address space

MAIN VIDEO OUTPUT

- Provides a standard RS-170 composite video signal: Z = 75 ohms, 1.4 volt p-p
- Can be set to generate 2, 4, 8 or 16 levels of gray scale

GRAPHIC DISPLAY

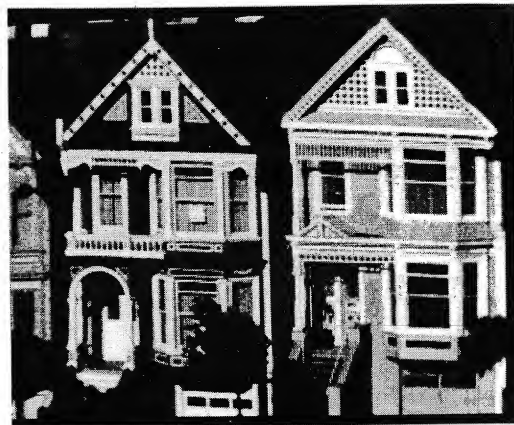
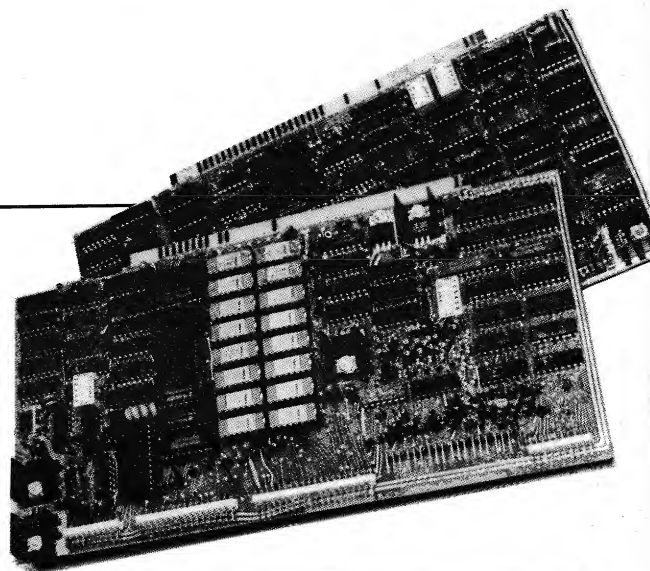
- On-board 4-bit D/A converter and B & W gray-scale video generator
- 4 individual pixel bit masks
- Two aspect ratios: square and rectangular
- For each aspect ratio, an image can be mapped into 3 interlaced formats and 7 non-interlaced formats
- Software-selectable graphic formats include 480x512x1, 240x512x2, 240x256x4 and 17 other formats.

VIDEO SYNCHRONIZATION

- Unit generates standard EIA RS-170 H & V drive signals. They can be used to synchronize TV cameras and other equipment.

POWER Typical values: +8V, 2.5A; +16V, 0.8A; -16V, 0.3A

TEMPERATURE Operating: +10 C to +50 C ambient



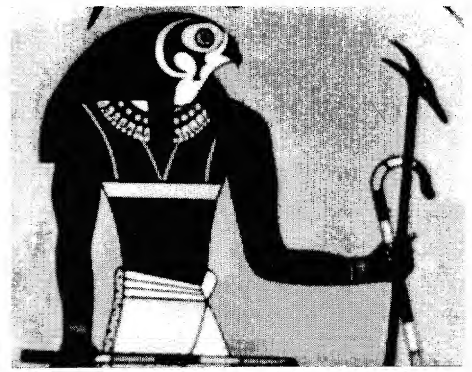
Option A: FRAME GRABBER

The frame grabber is a 4-bit real-time video image digitizer (A/D converter) that can freeze a single frame from a TV signal in 1/60th or 1/30th of a second. Each picture element (pixel) is reduced to the number measuring its brightness and stored into the image memory. The number of pixels per TV line and number of TV lines per frame (resolution & format) are selectable for the digitizer through the CAT-100's instruction registers in the same manner and with the same meaning as described for the graphic display. For example, if the display parameters are set for the 240 x 256 x 4 format, then the frame grabber will automatically

digitize pixels into 4-bit numbers (16 brightness levels) and pack them in the image memory in a manner fully compatible with the display.

FEATURES

- Accepts a standard composite B & W video input signal: Z = 75 ohm, 1.4V p-p
- Live video input can be displayed through the main output mixer
- On-board 4-bit A/D converter yields 16 gray-scale levels
- Can be set to generate 1, 2 or 4 bits per pixel
- Full video rate digitization: 1/60th of a second for a resolution of 240 x 256 x 4 or equivalent
- 640 pixels max. digitized per TV line
- Digitization formats exactly match selected display formats

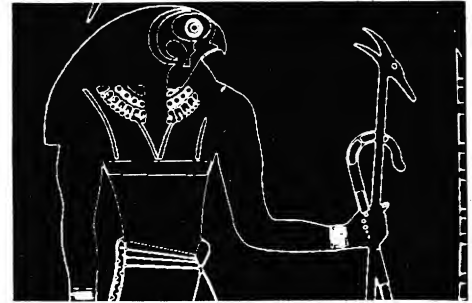
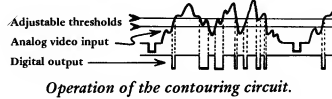


Option B: CONTOURING CIRCUIT

The contouring option is an alternate frame grabbing mode performing hardware edge extraction. The incoming video signal is compared with two external analog thresholds. If the brightness is between the thresholds, then a "1" bit is stored in the corresponding pixel of the frame buffer. In the illustration, both threshold levels are set close together in order to clearly delineate patterns.

FEATURES

- Can be set to generate 512 to 1280 single-bit pixels per TV line
- Can be used with one or two thresholds
- Threshold levels easily controlled by external potentiometers
- Live real-time contoured image is displayed through the main output mixer when contouring circuit is selected (preview feature)
- Contouring circuit requires option A



Option C: NTSC COMPOSITE COLOR OUTPUT

The CAT-100 can generate a standard NTSC color composite video signal on the main video output, instead of the monochrome B/W signal previously

described. Eight palettes of 16 colors are switch-selectable.

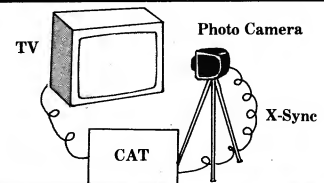
When the COLOR switch is on, the display aspect

can be manipulated in any of the ways available for B/W displays.

Option F: PHOTOGRAPHIC TRIGGER INPUT

The photo trigger synchronizes the display of a single frame with the shutter of a photographic camera. This feature is the solution to the usual problems of multiple uneven exposures (banding) encountered when one attempts to directly

photograph the screen of a raster-scan display. The X flash contacts of the camera trigger the display of a single and complete TV frame which is recorded on film.



Option L: LIGHTPEN INPUT

One of the most useful, interactive features for graphics and image processing tasks is the lightpen input. When lightpen operation is enabled and a pulse appears on the lightpen input, a "hit"

flag is set in status. The interaction is extremely precise and the 18 bits of X-Y coordinates provided by the system actually resolve one pixel in the 480 x 512 format.



Option P: CONDENSED FORMATS

Yields all the condensed formats listed in the specifications, such as 408 x 640 x 1, 408 x 320 x 2,

204 x 640 x 2 and 204 x 320 x 4, for special high density applications. The lower 1/6th of the screen remains blank.

408 x 640 x 1	204 x 640 x 2
408 x 320 x 1	204 x 320 x 1
408 x 320 x 2	204 x 320 x 2
204 x 1280 x 1	204 x 320 x 3
204 x 640 x 1	204 x 320 x 4

Option S: EXTERNAL SYNCHRONIZATION

Enables the CAT-100 to extract synchronization, under software control, from any composite video signal. The entire unit can lock its timing on an

external video source such as a TV camera, a video disc, a video cassette recorder or a program received off the air. This allows the CAT-100 to be

used in broadcasting or in any situation where the digital system must be synchronized with other video signals.

Option T: TEXT MODE

The CAT-100 provides an excellent tool for text editing and processing. Six different formats are available.

Characters are generated on a high-definition

7 x 9 matrix, and up to 2,640 characters can be displayed on the screen, organized as 33 lines of 80 characters. A unique smooth scrolling feature allows one to scan the entire text file with software-controlled speed, and the characters always

remain perfectly legible during scrolling.

Any character can be individually inverted and used as a cursor. Any portion of the 32K character text file can be displayed by setting the appropriate offset address in an instruction register.

The TEXT MODE option of the CAT-100 features a high quality 7x9 full ASCII character generator. This unretouched photograph shows the actual visual appearance of the most compact format available: 33 LINES OF 80 CHARACTERS.

Option X: RGB COLOR OUTPUT

The RGB color option offers 3 auxiliary composite video outputs channels in addition to the main

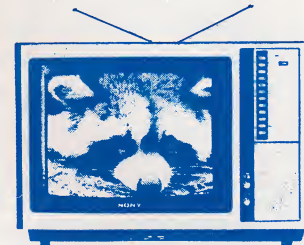
output. The CAT-100 can display up to 4 independent B/W graphics or drive an RGB color monitor using 3 out of the 4 output channels. In

terms of high resolution and color definition, the optimum display is provided by RGB monitors.

ACCESSORIES

COLOR VIDEO MONITOR

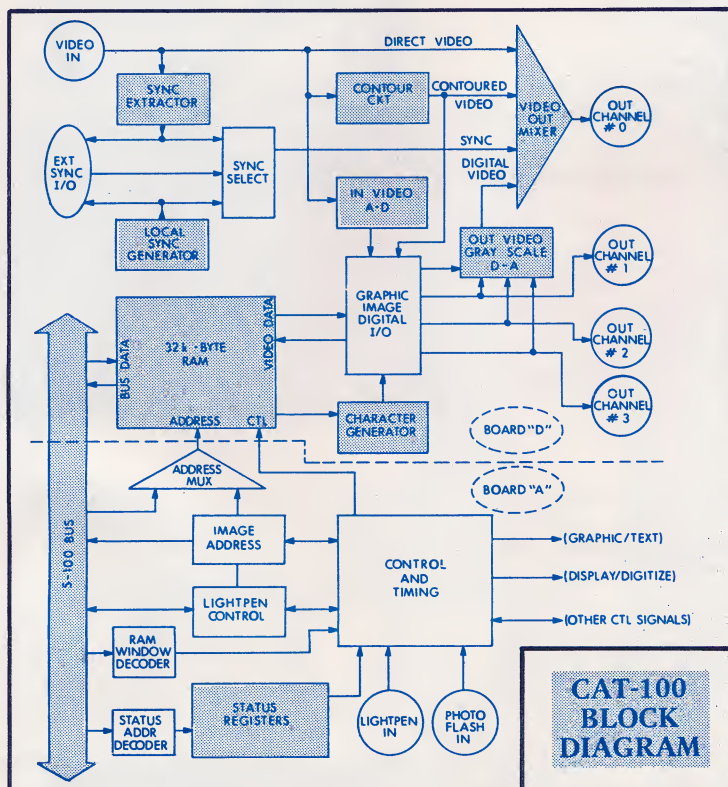
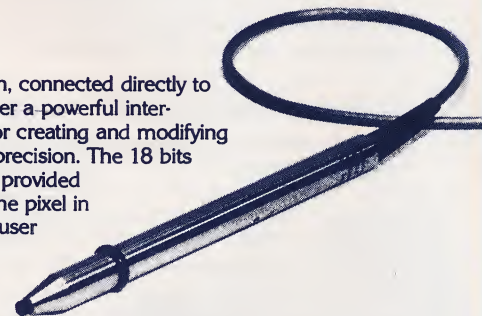
The S15RGB color video monitor has been designed to provide a quality display for the CAT-100 family of frame buffers. Its Sony Trinitron picture tube is a recognized standard for color separation, brilliance and overall quality. A diagonal of 38cm (15") provides the optimum balance between image area, pixel resolution and various human factors for interactive applications. The S15RGB has three modes of operation, selected by toggle switches:



1. TV receiver, provides BNC composite video output for off-air received signal.
2. Standard NTSC color monitor with single BNC composite video input.
3. High-resolution RGB color monitor with 3 separate BNC inputs for red, green and blue guns.

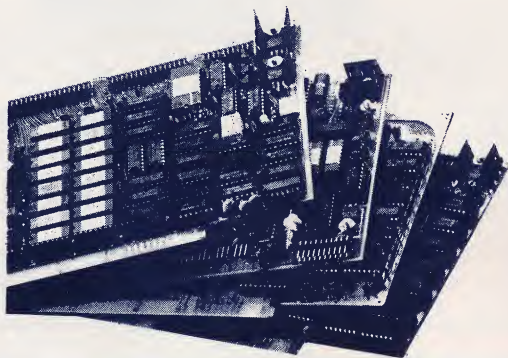
LIGHTPEN

A fully compatible lightpen, connected directly to the CAT-100 offers the user a powerful interactive tool that is useful for creating and modifying digital images with good precision. The 18 bits of coordinate information provided by the CAT-100 resolve one pixel in the 480x512 format. The user simply touches the tip of the lightpen to generate an actuation.



LARGE CATS

The CAT-100 can be expanded to larger configurations to give more gray scale levels and more colors. Standard color output is RGB (three independent composite video signals); high quality NTSC composite color video is optional.



CAT-200

- 4-board system
- **64K-byte** image memory
- Software selectable pixel sizes: 1, 2, 4 and 8 bit
- 256 gray levels or colors displayed at one time
- 12-bit or 24-bit wide color maps allow a choice from 4096 or 16 million possible colors
- New formats in addition to those available in the CAT-100: 480x512x2, 480x256x4, 240x512x4 and 240x256x8

CAT-400

- 4-board system
- **96K- or 128K-byte** image memory
- Software selectable pixel sizes: 1, 2, 3, 4, 6, 8, 12 and 16 bit
- 65,536 colors displayed at one time
- 24-bit wide color map allows a choice from 16 million colors
- New formats in addition to those above: 480x512x4, 480x256x8, 240x512x8 and 240x256x16

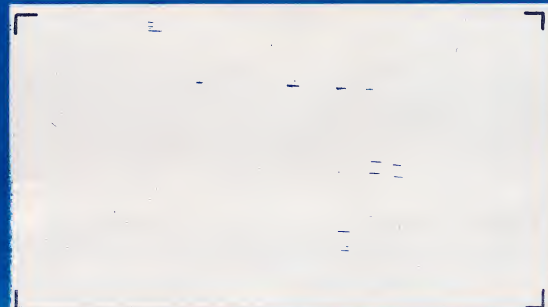
CAT-800

- 5- or 6-board systems
- **192K- or 256K-byte** image memory
- Selectable pixel sizes: 1, 2, 3, 4, 6, 8, 12, 16 and 24 bit
- New formats: 480x512x8, 480x256x16, 240x512x16 and 240x256x24

Represented By:



441 California Avenue • Palo Alto, CA 94306 • 415/494-6088





PRICE LIST

Spring 1980

TWO-BOARD CAT-100

CAT-100: STANDARD UNIT. Includes 32K bytes of image memory and the main B&W video generator with 16 gray levels. Complete with manuals, mating connectors and software driver listings in 8080 assembly language \$1525.00

Option A: FRAME GRABBER. Full speed, real time video image digitizer. Generates 1, 2 or 4 bits per pixel (16 gray levels) \$300.00

Option B: CONTOURING CIRCUIT. Accepts 2 external analog voltage levels, generates image outlines \$200.00

Option C: NTSC COMPOSITE COLOR OUTPUT. Maps each gray level into a color. Eight switch-selectable palettes of 16 colors. Standard color video signal \$150.00

Option F: PHOTOGRAPHIC TRIGGER INPUT. Yields clean and reliable photographs of video display screen \$120.00

Option L: LIGHTPEN INPUT. Allows efficient use of a high speed lightpen with optimum resolution. Must be ordered with a lightpen model LP777. . . \$100.00

Option M: LIGHTPEN INPUT, if ordered without lightpen \$200.00

Option P: CONDENSED FORMATS. Yield 320, 640 and 1280 pixels per raster line, for special applications \$200.00

Option S: EXTERNAL SYNCHRONIZATION. Enables the entire unit to lock its timing, under software control, on an external composite video signal \$150.00

Option T: TEXT MODE. Offers a densely packed display of 7x9 characters from the buffer used as a 32,768-character file. Generates a fully interlaced signal. Up to 33 lines of 80 characters \$150.00

Option X: RGB COLOR OUTPUT. Offers 3 auxiliary composite video outputs in addition to the main output \$200.00

STANDARD TWO-BOARD CAT-100 SYSTEMS

CAT-100/A Frame grabber and 16 level B/W display \$1825.00

CAT-100/X 16 color RGB display system. \$1725.00

CAT-100/T 16 level B/W display with alternate text mode \$1675.00

CAT-100/AX Frame grabber and 16 color RGB display \$2025.00

CAT-100/ABLX Frame grabber, contouring circuit, lightpen input and 16 color RGB display \$2325.00

CAT-100/FULL Full unit with all the available options: A, B, C, F, L, P, S, T and X. Special system price. \$2750.00

KITS

CATKIT/G Two bare boards for the full CAT-100 with all options. Documentation, schematics, assembly drawings. \$275.00

CATKIT/H Standard package of hard-to-get parts for above \$100.00

CATKIT/K Complete kit for full CAT-100, including boards and all parts. Documentation, schematics, assembly drawings. \$875.00

LARGE CATS

CAT-200 4-board system with 64K bytes of image memory and standard VM-111 video mapping board, 256 gray levels \$3450.00

CAT-400 4-board system with 128K bytes of image memory and standard VM-111 video mapping board, 256 gray levels \$4475.00

CAT-800 6-board system with 256K bytes of image memory and standard VM-111 video mapping board, 256 gray levels \$7850.00

OPTIONS

The following options, normally available on the two-board CAT-100, may also be ordered with any large CAT:

A, L, M, S.

In addition, the VMAP board may be ordered with more features than the minimal number installed in the standard VM-111 configuration.

VM-111. One format selector provides up to 8 bits per pixel. One 1K x 8 mapping memory for bit masking and gamma correction. 256 level B&W video output. N/C

VM-123. One format selector, two 1K x 8 color mapping memories. 256 simultaneous RGB colors out of 65K color field \$450.00

VM-133. One format selector, three 1K x 8 color mapping memories. 256 simultaneous RGB colors out of 16M color field. \$600.00

VM-223. Two format selectors provide up to 16 bits per pixel. Two 1K x 8 color mapping memories. RGB video output is 65,536 simultaneous colors. For CAT-400 or CAT-800 only \$600.00

VM-333. Three format selectors provide up to 24 bits per pixel. Three 1K x 8 color mapping memories. 65K or 16.7 million simultaneous RGB colors. For CAT-400 or CAT-800 only. \$900.00

NTSC option. Any VMAP board configured with RGB output may also be ordered with NTSC composite color video encoder \$250.00

ACCESSORIES

S15RGB 38cm (15" diagonal) Sony Trinitron color monitor with three switch-selectable modes of operation:

1. TV receiver, provides BNC composite video output for off-air received signal
2. Standard NTSC color monitor with single BNC composite video input
3. High resolution RGB color monitor with separate BNC inputs for red, green and blue guns. Individual color balance controls. \$1145.00

C3RGB Set 3 RGB cables (4m ea.) for connecting CAT system to S15RGB \$65.00

LP777 High sensitivity, high resolution lightpen. Plugs directly into the CAT's lightpen connector. \$350.00

ITC-52 Ikegami high resolution B&W TV camera with 25mm vidicon and external drive. Without lens. \$425.00

25mm LENS for above camera. \$118.00

We carry the full line of high quality Ikegami TV cameras and monitors. Large number of models available. Please inquire.

RCCU Remote contrast control unit for 4-bit frame grabber, option A. Provides independent control of upper and lower limits of digitizing range according to subject contrast and light level \$150.00

SOFTWARE

GRAPH is a package containing a set of fundamental driver routines to plot points, draw curves and overlay text, labels and titles over an existing digital image in selectable intensities, colors, slopes, and sizes in all twenty-one formats of the CAT-100. The routines are supplied in 8080 assembly source code and are callable from BASIC. The following versions are available:

ORDER #	MEDIA	OP. SYSTEM	COMMENTS	PRICE
G/ECPM	8" diskette	CP/M	Compatible with 8" floppy systems	\$145.00
G/MSTD	5 1/4" Micropolis mod. II	MDOS	Std. Micropolis	\$100.00
G/MCPM	5 1/4" Micropolis mod. II	CP/M & MDOS	Two sides	\$125.00
G/NALS	5 1/4" North *	ALS8	Short labels	\$100.00
G/NCPM	5 1/4" North *	CP/M		\$125.00
G/CALS	CUTS cassette	ALS8	Short labels	\$100.00

Call for new packages, formats and paper listings.

MANUALS

Complete manuals are included with all units. They are available separately at \$15.00 each, prepaid, refundable with first order.

TERMS

Prepaid and COD orders: 5% discount off list price.
All other orders, with approved credit: net/30 days.
All prices are FOB Palo Alto, CA.

FREIGHT & INSURANCE

According to weight, \$5.00 to \$8.00 U.S., Canada. Color monitors: \$25.00 to \$40.00. Call for Federal Express. All shipments insured for full value.

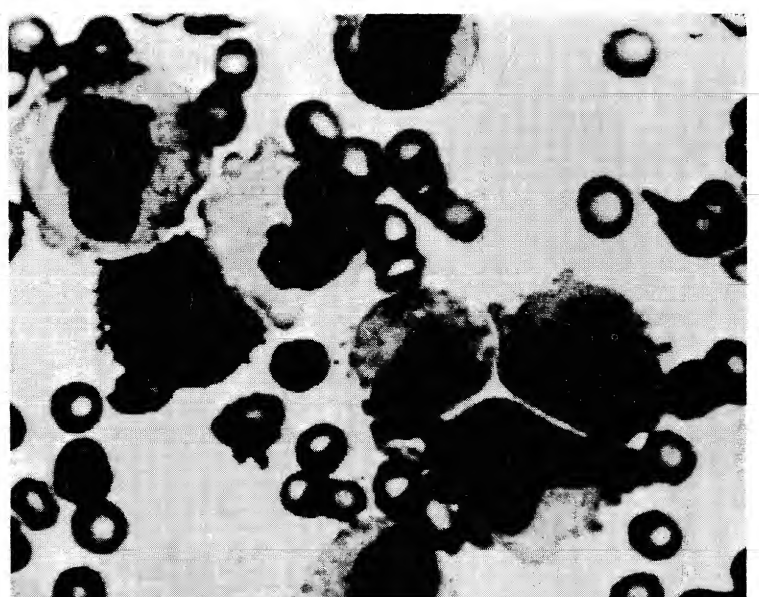
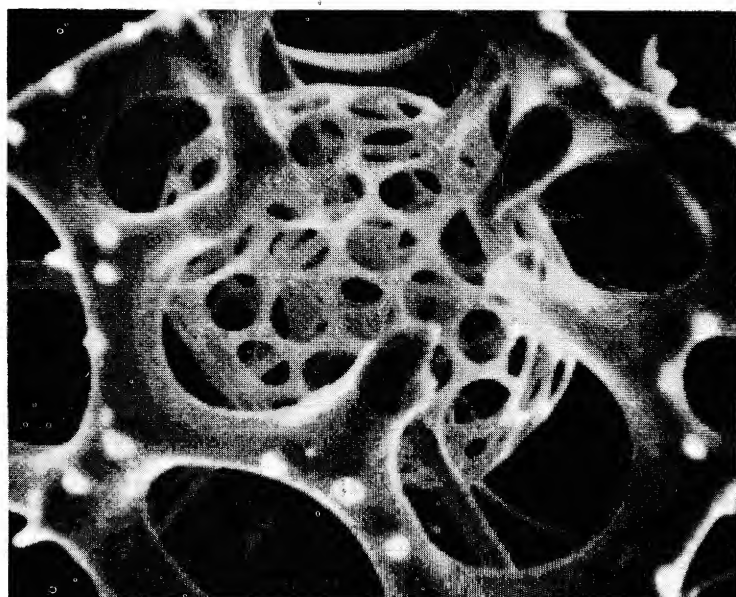
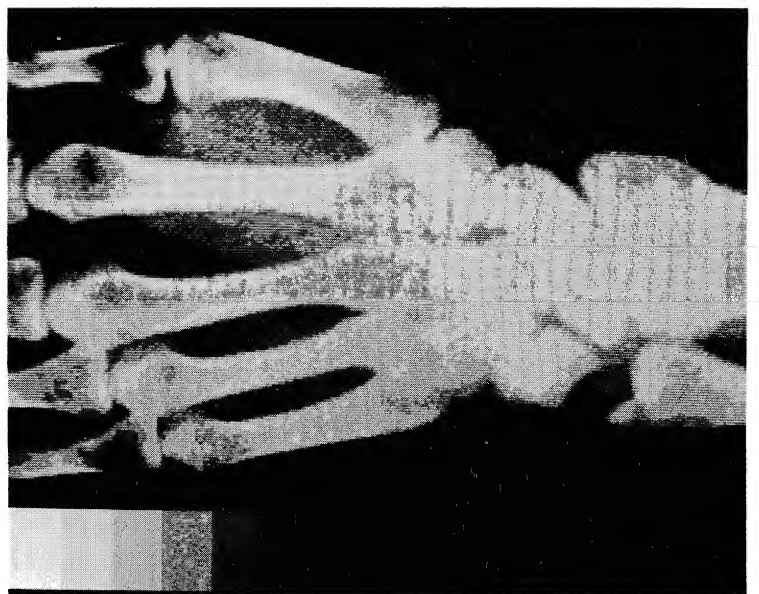
OEM & DEALERS

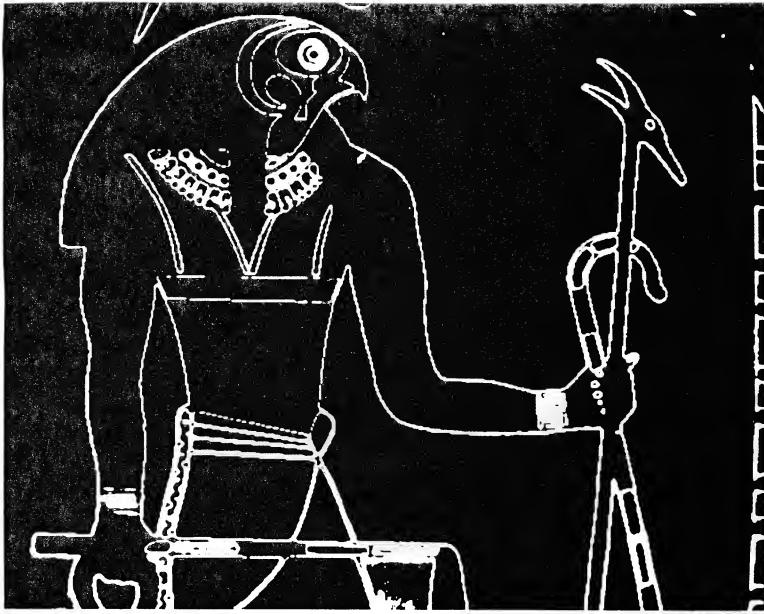
Please inquire for contract and discount schedules.

WARRANTY

ALL DIGITAL GRAPHIC SYSTEMS products carry a six-month limited warranty.

* * * * *





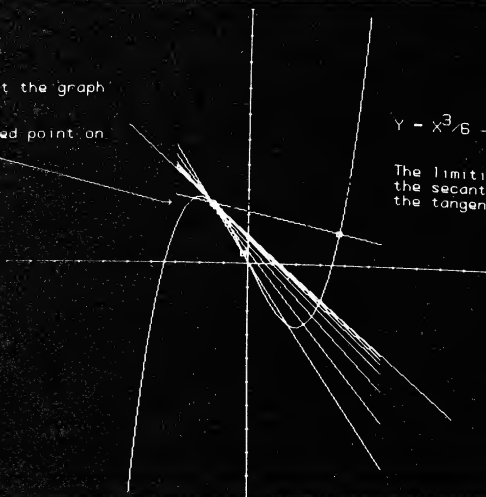
A CALCULUS LESSON

SECANTS

Suppose we plot the graph of a function and pick a fixed point on the graph.

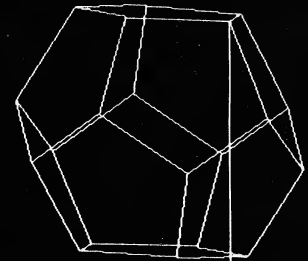
$$Y = X^3/6 - 2X$$

The limiting position of the secant lines gives the tangent line.



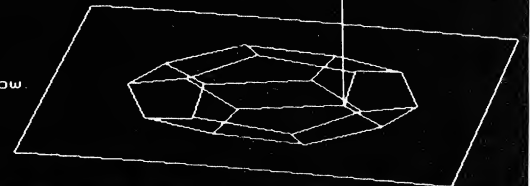
This program illustrates the idea of projections.

The Dodecahedron is a three-dimensional figure.



The projection is obtained by dropping perpendiculars onto a level surface.

Its projection looks like a shadow.



Courtesy of Dr. Christopher Morgan, Cal. State Univ., Hayward, Ca.

monitor the status of CA
 — TV line activity; TV f
 vertical blanking; digitize
 — Lightpen "seen" flag;

GRAPHIC MEMORY BUF

- On-board 32K-byte capac
 - Organized in 2 banks of
 - Expandable up to 256K
- extension boards for bett

